UPDATE

Propaq CS® Directions For Use

Update for Software Version 3.3X

Propaq Encore® Reference Guide

Update for Software Version 2.3X

Keep this update in the back pocket of your manual.

Welch Allyn®

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About this Update

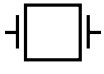
This Update describes the changes in the operation of the Propaq® CS monitor (software version 3.3X) and Propaq® Encore monitor (software version 2.3X). These changes are primarily associated with the Pulse Oximetry (SpO_2) options that are available for use with the Propaq CS and Propaq Encore monitors:

- Masimo® Pulse Oximetry option (motion tolerant).
- Nellcor® Pulse Oximetry option (motion tolerant).
- Nellcor® Pulse Oximetry option (without motion tolerance).

For all other operating information for these monitors, refer to these documentation kits:

- 810-1102-XX Propaq CS 3.XX Directions For Use Kit
- 810-0867-XX Propaq Encore 2.XX Reference Guide Kit

Symbols

	Protected during defibrillation

General Warnings and Cautions

Familiarize yourself with all warnings and cautions before using the Propaq monitor.

Warning

Do not operate this product in the presence of flammable anesthetics or other flammable substance in combination with air, oxygen-enriched environments, or nitrous oxide; explosion can result.

The pulse oximetry channel should NOT be used as an apnea monitor.

This monitor is to be operated by qualified personnel only. The operator of this monitor should read this entire manual, the monitor *Reference Guide* or *Directions For Use*, and all accessory *Directions For Use* before operating the monitor.

This monitor should only be repaired by qualified service personnel. The operator should not attempt to open the monitor case or perform any maintenance on the monitor except for procedures explicitly described in this manual that can be performed by operators such as inspection and cleaning.

When using a power adapter with this monitor, be sure to connect the power adapter to a three-wire, grounded, hospital-grade receptacle. Do not under any circumstances attempt to remove the grounding conductor from the power plug of the power adapter. Do not plug the power adapter into an extension cord. If there is any doubt about the integrity of the protective earth ground of the receptacle for the power adapter, do not plug in the power adapter; operate the monitor only on battery power. Contact your biomedical engineering department for assistance in identifying the proper power receptacle and making appropriate power connections.

Place the Propaq monitor and accessories in locations where they cannot harm the patient if they fall from their shelf or mount. Lift the monitor only by its handle; do not lift it by any attached cables.

Safe interconnection between the Propaq monitor and other devices must comply with applicable medical systems safety standards such as IEC 60601-1-1. Within certain governmental jurisdictions, all interconnected accessory equipment must be labeled by an approved testing laboratory. After interconnection with accessory equipment, risk (leakage) current and grounding requirements must be maintained.

As with all medical equipment, carefully route the patient cabling to reduce the possibility of patient entanglement or strangulation.

SpO_2 Monitoring

Warning

Oxygen saturation measurements using pulse oximetry are highly dependent on proper placement of the sensor and patient conditions. Patient conditions such as shivering and smoke inhalation may result in erroneous oxygen saturation readings. If pulse oximetry measurements are suspect, verify the reading using another clinically accepted measurement method, such as arterial blood gas measurements on a co-oximeter.

Tissue damage can be caused by incorrect application or use of a sensor (e.g., wrapping the sensor too tightly, applying supplemental tape, failing to periodically inspect the sensor site, leaving a sensor on too long in one place). Refer to the Directions for Use provided with each sensor for specific instructions on application and use, and for description, warnings, cautions, and specifications.

Sensors exposed to ambient light while not applied to a patient can exhibit semi-normal saturation readings. Be sure the sensor is securely placed on the patient and check its application often to ensure accurate readings.

Inaccurate measurements may be caused by venous pulsations.

The pulse oximetry option can be used during defibrillation, but the readings may be inaccurate for a short time.

Interfering Substances: Carboxyhemoglobin may erroneously increase readings; the level of increase is approximately equal to the amount of carboxyhemoglobin present. Methemoglobin may also cause erroneous readings. Dyes, or any substances containing dyes, that change usual arterial pigmentation may cause erroneous readings.

Before you use a Propaq monitor on a new patient, always turn off the monitor for a few seconds, then turn it on again. This clears the prior patient's trend values, alarm limit settings, and NIBP cuff inflation target.

Each SpO_2 sensor is designed for application to a specific site on the patient within a certain size range. To obtain optimal performance, use an appropriate sensor and apply it as described in the sensor's directions for use.

If excessive ambient light is present, cover the sensor site with opaque material to block the light. Failure to do so may result in inaccurate measurements. Light sources that can affect performance include surgical lights (especially those with a xenon light source), bilirubin lamps, fluorescent lights, infrared heating lamps, and direct sunlight.

If NIBP will be monitored while using SpO_2, place the NIBP cuff on a different limb than the SpO_2 sensor to help reduce unnecessary SpO_2 alarms. For optimal measurements, avoid placing the SpO_2 sensor on the same limb as an arterial catheter or intravascular line.

Loss of pulse signal can occur if the sensor is too tight, there is excessive ambient light, an NIBP cuff is inflated on the same limb as the sensor, there is arterial occlusion proximal to the sensor, the patient is in cardiac arrest or shock, or the patient has hypotension, severe vasoconstriction, severe anemia, or hypothermia.

Perform SpO_2 Monitoring with Masimo Option

1. Attach the sensor to the patient according to the sensor manufacturer's instructions, observing all warnings and cautions.

Warning

Use only Masimo accessories and sensors with the monitor with Masimo SpO_2 option as listed in the Welch Allyn *Products and Accessories* booklet (810-0409-XX).

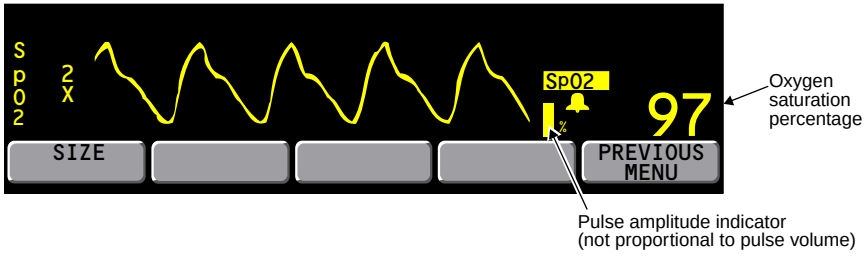
2. Inspect the Masimo SpO_2 cable. Replace it if it shows any signs of wear, breakage, or fraying. Plug the sensor into the cable and plug the cable into the Propaq monitor.

   The monitor displays STANDBY in the SpO_2 numeric window until it measures and displays the SpO_2 value.

   As oxygen saturation increases and decreases, the pitch of the heart tone rises and falls.

   The monitor self-calibrates the SpO_2 channel whenever the monitor is first turned on or a sensor is first connected to the SpO_2 channel.

3. From the Main Menu, press **SpO2** (or **SpO2/CO2**, then **SpO2**) to display the SpO_2 menu similar to the following:



4. Press **SIZE** to adjust the waveform size for best viewing (1x, 2x, 4x, or 8x).

5. Adjust the placement of the sensor until a good SpO_2 waveform is displayed. A waveform with artifact may cause erroneous oxygen saturation readings.

6. Set alarm limits according to your hospital's standards.

Note

To help minimize false alarms, the Propaq monitor briefly delays or "holds off" triggering both audible and visual alarms for limit violations for SpO_2% and Pulse Rate for 10 seconds. After the alarm hold-off period begins, if the monitor detects that the patient's vital sign has returned to acceptable limits, the monitor cancels the alarm hold-off. The next time a vital sign limit is violated, the monitor starts a new hold-off period.

The "averaging time" for SpO_2 measurements is fixed at eight seconds.

7. If patient movement interferes with measurements, consider the following possible solutions:

   - be sure the sensor is secure and properly applied
   - use a new sensor with fresh adhesive backing
   - select a different type of sensor
   - move the sensor to a less active site

Perform SpO_2 Monitoring with Nellcor Option

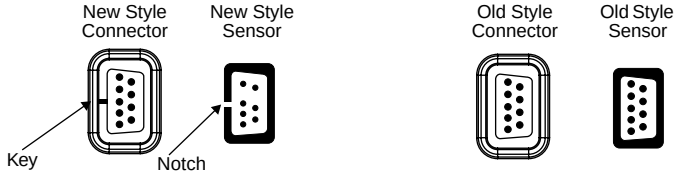
1. Attach the sensor to the patient according to the sensor manufacturer's instructions, observing all warnings and cautions.

Warning

Use only Nellcor accessories and sensors with the monitor with Nellcor SpO_2 option as listed in the Welch Allyn *Products and Accessories* booklet (810-0409-XX).

Note

Older style Nellcor sensors and extension cables are not compatible with the connector on the Nellcor option with motion tolerance, and cannot be plugged into it. However, new style Nellcor sensors and extension cables can be used with all Nellcor options, and can be plugged into either the old or new style connectors. The new style sensor and connector can be identified by a "notch" and "key" as shown below:



2. If using a Nellcor SpO_2 sensor extension cable, inspect the cable before use. Replace it if it shows any signs of wear, breakage, or fraying. Plug the sensor into the cable and plug the cable into the Propaq monitor, or plug the sensor directly into the monitor.

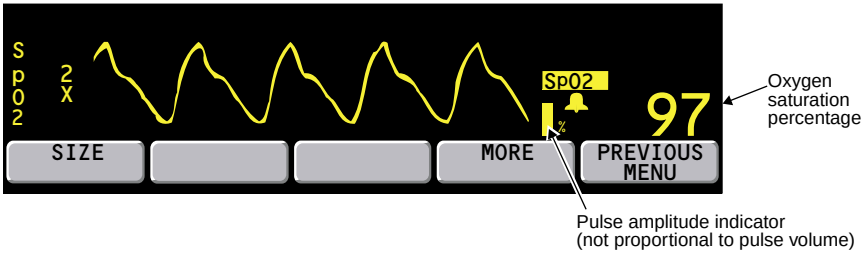
3. If the monitor SpO_2 receptacle has a locking ring, lock the connector in place by turning the locking ring clockwise until it stops.

   The monitor displays STANDBY in the SpO_2 numeric window until it measures and displays the SpO_2 value.

   As oxygen saturation increases and decreases, the pitch of the heart tone rises and falls.

   The Nellcor SpO_2 option periodically performs an internal adjustment which causes the SpO_2 waveform to appear flat for a brief period.

4. From the Main Menu, press **SpO2** (or **SpO2/CO2**, then **SpO2**) to display the first SpO_2 menu similar to the following:



5. Press **SIZE** to adjust the waveform size for best viewing (1x, 2x, 4x, or 8x).

   At high magnification (4x, 8x), some waveforms may appear truncated. To view these waveforms, reduce the size until the complete waveform appears.

6. Adjust the placement of the sensor until a good SpO_2 waveform is displayed. A waveform with artifact may cause erroneous oxygen saturation readings.

7. Press **MORE** to display the second SpO_2 menu:

8. Press **RESPONSE** to select the appropriate time required to measure SpO_2:

Response	Indications for Use
NORMAL: 5-7 seconds	Use for relatively stable patients.
FAST: 2-3 seconds	Use when patient movement or other artifact is not present.
SLOW: 10-15 seconds[1]	Use when patients exhibiting movement are preventing accurate measurement at NORMAL setting.

1. SLOW setting is not applicable to the Nellcor SpO_2 option with motion tolerance.

9. If the C-LOCK function is desired, press **C-LOCK** to set it to ON.

C-LOCK synchronizes the pulse oximeter's systole determination to the R-wave to reduce the effects artifact may have on SpO_2 measurements. Under some conditions you may find more stable SpO_2 readings with C-LOCK set to ON. SYNC appears next to the waveform when synchronization to the ECG has been obtained. Synchronization takes a few seconds to establish the first time. If C-LOCK is on and the HR source is SpO_2, the heart rate source is automatically changed to ECG. An ECG signal must be present or C-LOCK does not activate.

If you get false SpO_2 alarms with patients with low perfusion states or multiple arrhythmias, try turning off C-LOCK.

10. Set alarm limits according to your hospital's standards.

Note

To help minimize false alarms, the Propaq monitor briefly delays or "holds off" triggering both audible and visual alarms for limit violations for SpO_2% and Pulse Rate for 10 seconds. After the alarm hold-off period begins, if the monitor detects that the patient's vital sign has returned to acceptable limits, the monitor cancels the alarm hold-off. The next time a vital sign limit is violated, the monitor starts a new hold-off period.

11. If patient movement interferes with measurements, consider the following possible solutions:

- be sure the sensor is secure and properly applied
- use a new sensor with fresh adhesive backing
- select a different type of sensor
- move the sensor to a less active site

Perform SpO_2 "Spot-Check" Monitoring

The SpO_2 Standby Mode allows you to remove the SpO_2 sensor from a patient without having to disable all alarms or disconnect the SpO_2 sensor cable from the Propaq CS monitor. You can therefore perform intermittent or "spot-check" SpO_2 monitoring.

1. While monitoring SpO_2, remove the SpO_2 sensor from the patient, but leave it connected to the monitor. When the monitor detects the lack of a pulsatile waveform, it sounds a patient alarm and displays this menu:

2. Press **STANDBY** to place SpO_2 into the Standby Mode.

   The monitor suspends the SpO_2 alarm tone indefinitely and displays **STANDBY** in place of SpO_2 numerics. SpO_2 remains in the Standby Mode until the SpO_2 sensor is reapplied to a patient. Other vital sign monitoring is not restricted. By contrast, if you press **SUSPEND** instead of **STANDBY**, the monitor temporarily suspends all alarm tones; however, the alarm tone resumes after 90 seconds if the SpO_2 sensor is still disconnected from the patient.

3. To resume SpO_2 monitoring, reapply the SpO_2 sensor to a patient.

   The monitor exits the Standby Mode and resumes SpO_2 monitoring

Note

The message STBY on the SpO_2 trend display and trend printouts indicates the monitor was in the SpO_2 Standby Mode.

NIBP Trends and SEARCH Message

When the SEARCH message appears in an NIBP TREND display or printout, it indicates that the monitor was not able to complete an NIBP measurement during that time period.

Specifications

Pulse Oximetry (SpO_2) Specifications for Masimo SpO_2

Characteristic	Specification
Saturation (% SpO_2) Range Resolution Alarm Limits	 1% to 100% 1% 52% to 100% (upper) 50% to 98% (lower)
Probe Accuracy (25° to 41° C) Adults, Pediatrics: No motion Neonates: No motion Adults, Pediatrics, Neonates: During Motion[1,2]	 70% to 100% ±2 counts 0% to 69% unspecified 70% to 100% ±3 counts 0% to 69% unspecified 70% to 100% ±3 counts 0% to 69% unspecified
Pulse Rate Range: No motion Range: During motion[1,2] Resolution Alarm Limits	 26 to 239 beats per minute, ±3 counts 26 to 239 beats per minute, ±5 counts 1 beat per minute 27 to 250 beats per minute (upper) 25 to 248 beats per minute (lower) Note: Any pulse rate above 239 will activate the pulse rate alarm, even if the upper alarm limit is set above 239. If the lower alarm limit is set to 25, a pulse rate of 25 will activate the pulse rate alarm due to the limitation of the displayable numeric range.
Pulse Rate Accuracy No Motion During Motion[1,2]	 ±3 beats per minute ±5 beats per minute
Measurement averaging time	8 seconds
Alarm Hold-Off Time Period	10 seconds; resets if the sensor reports levels within limits before 10 seconds elapses
Circuitry	Microprocessor controlled Automatic self-test of oximeter when powered on Automatic setting of default parameters Automatic alarm messages
Electrosurgery interference suppression	Yes

Pulse Oximetry (SpO_2) Specifications for Masimo SpO_2 (Cont.)

Characteristic	Specification
Sensor Compatibility	Compatible only with Masimo sensors listed in the Welch Allyn *Products and Accessories* booklet.
Sensor LEDs RED Wavelength INFRARED Wavelength	 660 nm (nominal) 905 nm (nominal)
Sensor Energies (Radiant Power)	0.13 mW to 0.79 mW at 50 mA pulsed

1. Motion for adults and pediatrics is defined as rubbing and tapping motions at 2 to 4 Hz at an amplitude of 1 to 2 cm and a non-repetitive motion between 1 to 5 Hz at an amplitude of 2 to 3 cm in induced hypoxia studies in the range of 70-100% SpO_2 against a laboratory co-oximeter and ECG monitor. This variation equals ±1 standard deviation which encompasses 68% of the population.

2. Motion for neonates is defined as foot motions at 2 to 4 Hz at an amplitude of 1 to 2 cm against a laboratory co-oximeter and ECG monitor. This variation equals ±1 standard deviation which encompasses 68% of the population.

Pulse Oximetry (SpO_2) Specifications for Nellcor SpO_2

Characteristic	Specification
Saturation (% SpO_2) Range Resolution Alarm Limits[1]	 0% to 100% 1% 52% to 100% (upper) 50% to 98% (lower)
Probe Accuracy[2] (saturation levels between 70% and 100%, 28° to 42°C) Adult/Pediatric Neonatal	 Digit accuracy: ±2 counts Digit accuracy: ±3 counts
Pulse Rate Range[3] Alarm Limits	 Motion tolerant option: 25 to 249 beats per minute Option without motion tolerance: 25 to 250 beats per minute 27 to 250 beats per minute (upper) 25 to 248 beats per minute (lower)
Pulse Rate Accuracy No Motion During Motion	 ±3 beats per minute ±5 beats per minute

Pulse Oximetry (SpO_2) Specifications for Nellcor SpO_2 (Cont.)

Characteristic	Specification
Alarm Hold-Off Time Period	10 seconds; resets if the sensor reports levels within limits before 10 seconds elapses
Circuitry	Microprocessor controlled Automatic self-test of oximeter when powered on Automatic setting of default parameters Automatic alarm messages
Electrosurgery interference suppression	Yes
Sensor Compatibility	Compatible only with Nellcor sensors listed in the Welch Allyn *Products and Accessories* booklet.
Sensor LEDs RED Wavelength INFRARED (IR) Wavelength	 660 nm (nominal) 880 nm (nominal)
Sensor Energies (Radiant Power) Electrical Power Optical Power	 Red LED 31.3 mW max. IR LED 28.8 mW max. Red LED 0.8 to 3 mW IR LED 1.5 to 4 mW

1. Minimum difference between upper and lower alarm limits is 2%.

2. Refer to the Welch Allyn *Products and Accessories* guide (810-0409-XX) for accuracy specifications for all Nellcor SpO_2 probes recommended for use.

3. When using the pulse oximetry option with motion tolerance, a substantial and rapid (<2 seconds) drop in pulse rate may result in erroneous pulse rate readings and loss of the audible pulse indicator.